

WHAT IS CLAIMED IS:

1. A method of manufacturing an electron-emitting element for emitting electrons from diamond, comprising:

the first step of forming a diamond columnar member on a diamond substrate; and

the second step of forming an electron-emitting portion having a base portion and a sharp-pointed portion which is located closer to a distal end side than the base portion and emits the electrons by performing etching processing with respect to the columnar member.

2. A method according to claim 1, wherein the etching in the second step is plasma etching.

3. A method according to claim 1, wherein in the second step, a portion of the diamond substrate other than a portion where the columnar member is formed is masked, and reactive ion etching is performed with respect to the columnar member.

4. A method according to claim 1, wherein in the first step, the diamond substrate is etched after a circular mask portion is formed on a surface of the diamond substrate, and

in the second step, the electron-emitting portion is formed by performing etching with respect to the columnar member with a ratio of an etching rate in a

lateral direction to an etching rate in a longitudinal direction being higher than that in the etching in the first step.

5. An electronic device comprising:

an electron-emitting element manufactured by the method defined in claim 1; and

an electron extraction electrode placed to oppose the sharp-pointed portion, with a voltage being applied between said electron extraction electrode and said electron-emitting element.

6. A device according to claim 5, further comprising:

a metal gate electrode formed around the base portion of said electron-emitting element; and

a power supply for applying a voltage to said gate electrode.

7. A method of manufacturing an electron-emitting element for emitting electrons from diamond, comprising:

the first step of forming a diamond columnar member on a diamond substrate; and

the second step of forming an electron-emitting portion having a base portion, a sharp-pointed portion for emitting the electrons, and a columnar intermediate portion located between the base portion and the sharp-pointed portion by performing diamond synthesis

processing with respect to the columnar member.

8. An electronic device comprising:

an electron-emitting element manufactured by the method defined in claim 7; and

an electron extraction electrode placed to oppose the sharp-pointed portion, with a voltage being applied between said electron extraction electrode and said electron-emitting element.